

## **Study of Solar Radiation Variation over an Area Using GNSS Observations – Spatial Reference to KDU Southern Campus**

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### **Abstract**

At present, Global Navigation Satellite Systems (GNSS) are used to study the behaviour of the atmosphere including the ionosphere and the troposphere by calculating the time taken for a GNSS satellite signal to reach the Earth. The GNSS satellite signals get interrupted while travelling through the ionosphere due to free electrons produced from exposing the particles in the atmosphere to extreme Ultraviolet radiations. These amounts of free electrons are identified as the Total Electron Content (TEC) in the ionosphere. So due to these interruptions, a delay occurs when GNSS satellite signals reach the GNSS receivers on the Earth's surface. This effect is called as the ionospheric delay. So, scientists use statistics related to ionospheric delay to study the behaviour of the ionosphere. This study also describes a method to obtain the TEC in the ionosphere using the ionospheric delay and determines the solar radiation variation over an area using those calculated TEC values. Herein, single-frequency GNSS signals of the Global Positioning System were used and thereafter TEC values along each signal path were calculated. Then the variations of TEC values were obtained and thereby an equation was derived through nonlinear regression analysis to predict the solar radiation variation. After the analysis, the study is concluded by obtaining the TEC variations over an area and finding an ideal method to obtain solar radiation variation using those TEC values obtained with the help of the model created through nonlinear regression analysis.

**Keywords:** *GNSS, Solar Radiation, TEC*